

D. Remarks

The claims are 1-7, with claim 1 being the sole independent claim. Claim 1 has been amended for clarification. Support for this amendment may be found, inter alia, in the specification on pages 14-18. New claim 7 has been added based on the language removed from claim 1 and the disclosure in the specification on pages 18-19. The specification has been amended to correct typographical and grammatical errors. No new matter has been added. Reconsideration of the claims is expressly requested.

Applicant's undersigned attorney conducted a telephonic interview with the Examiner upon receiving the outstanding Office Action. In the interview, Applicant's attorney explained to the Examiner that the compensation patterns of the present invention are a mask and that the structure identified by the Examiner in U.S. Patent No. 5,992,974 (Miyata) as the compensation patterns is not a mask, but a complete nozzle plate.

In view of the discussion during the above-mentioned telephonic interview, the Examiner asked Applicant's undersigned attorney to request the Examiner to contact him via telephone upon reviewing the present Amendment. Applicant's undersigned attorney hereby makes this request.

Claims 1-4 stand rejected under 35 U.S.C. § 102(b) as being allegedly anticipated by U.S. Patent No. 5,992,974 (Miyata). Claims 5 and 6 stand rejected under 35 U.S.C. § 103(a) as being allegedly unpatentable over Miyata. These rejections are respectfully traversed.

Prior to addressing the merits of rejection, Applicant would like to briefly review some of the key features of the presently claimed invention. The present invention

is directed to a method of manufacturing a liquid jet recording head. In this method, an anisotropic-etching mask is formed on a nozzle surface of the top plate. Then, this mask is patterned to form compensation patterns, which extend into the liquid chamber region of the plate. Then, the top plate is etched using the compensation patterns as a mask.

For the Examiner's convenience, Applicant hereby provides an example of presently claimed method. Applicant notes that this method is merely an example and does not limit the claimed invention.¹

Initially, a SiO₂ layer is formed on a front and a back surface of the silicon wafer 5 (page 14, line 23 - page 15, line 8). The back surface is then patterned into a shape of the nozzles and the liquid chamber. The front surface is patterned into a shape of the liquid chamber, and the patterning shape on the front surface is a comb shape (compensation pattern) (page 15, line 8 - page 16, line 10). The SiO₂ layer on the back surface of the wafer is coated with a SiN layer 7. This SiN is then patterned into a comb shape. Thus, the comb-shaped compensation patterns are formed opposite each other on the front and the back surface of the silicon wafer 5.

Then, the etching process is commenced. The entire silicon wafer 5 is simmered in an etchant, and the silicon exposed by the comb-shaped compensation patterns on both the front and the back surface is anisotropically etched (page 16, lines 11-18). Since the SiO₂ layer and the SiN layer are not etched by the etchant used to etch the wafer, the wafer is over-etched such that a portion of the compensation patterns protrudes

¹/Figs. 2A-C illustrate a process in which the silicon wafer is over-etched inside of the compensation pattern while in transition from a state depicted in Fig. 1E' to the one shown in Fig. 1F', and the liquid chamber having a desired shape is formed.

over the edge of the wafer in an eaves shape. Then, the SiN layer on the back surface is removed by etching after anisotropic etching is completed. Thus, one comb-shaped compensation pattern is removed from the silicon wafer, and the nozzle pattern on the SiO₂ layer 6 on the back surface is exposed (page 18, lines 21-24).

The nozzles are then formed on the silicon wafer 5 by anisotropic etching (page 18, line 22 - page 19, line 2). Lastly, the eaves-shaped portion of the compensation pattern or the entire SiO₂ layer is removed by spraying air at a high pressure (page 19, lines 20-25).

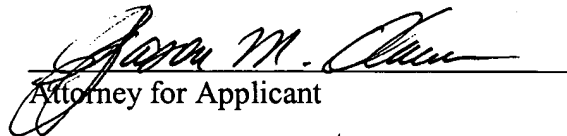
Miyata is directed to an ink-jet head having nozzle openings through which ink droplets are discharged. The Examiner pointed to Fig. 7(a) in Miyata as allegedly showing the compensation patterns of the presently claimed invention. Specifically, the Examiner has alleged that the compensation patterns of Miyata comprise reference numerals 61, 7 and 51. Applicant respectfully disagrees.

Miyata's Fig. 7(a) does not show compensation patterns as presently claimed. As discussed in detail above, the compensation patterns of the present invention are a mask, which is used to etch the top plate (see page 15, line 23 - page 24, line 2). To the contrary, Fig. 7(a) in Miyata shows a complete nozzle plate. It is clear that supply ports 61, the nozzle openings 7 and ink reservoirs 51 are not a part of a mask through which the nozzle plate is etched. It is also clear that the compensation patterns of the presently claimed invention are never formed in the etching processes disclosed in Miyata.

Accordingly, it is clear that the presently claimed invention is patentable over Miyata. Wherefore, Applicant respectfully requests that the outstanding rejection be withdrawn and that the present case be passed to issue.

Applicant's undersigned attorney may be reached in our New York office by telephone at (212) 218-2100. All correspondence should continue to be directed to our address given below.

Respectfully submitted,


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